KATHMANDU UNIVERSITY
End Semester Examination [C]
June/July 2024

Level : B.Sc.
Year : III
Time : 2 hrs. 30mins.

Course : COMP 342
Semester : I
F. M. : 40

SECTION "B"
[6 Q. × 4 = 24 marks]

3 0 JUN 2024

Attempt *ANY SIX* questions.

1. Computer graphics are so popular that virtually there is no area where it is not use, what are the reasons behind the popularity of interactive computer graphics as a practical tool? In Nepal there is always an issue with regard to quality school education in remote areas, describe how this issue can handled with effective use of computer graphics? [1+3=4]

2. Describe Run-Length Encoding technique? Explain the basic video controller refresh operation with appropriate diagram. [1+3=4]

3. Scale the triangle with coordinate A (10,10), B (20,10) and C(15,15) to double its size keeping B(20,10) fixed? [4]

4. Clip a line with coordinates and L1(-1,4,4,9) against a rectangular window with dimension R(-2,2,2,5) using Cohen Sutherland line clipping algorithm? [1+3=4]

5. Differentiate between object space method and image space method? Explain the back-face detection techniques for right handed system with necessary mathematics relation and examples? [2+2=4]

6. Describe Constant Intensity Shading with relevant example? Differentiate between Specular Reflection and Gouraud reflection? [3+1=4]

7. Write Short notes on: [2+2=4]
   a. CIE Color model
   b. Design of Animation Sequences

SECTION "C"
[2Q × 8 =16 marks]

Attempt *ALL* questions.

8. Derive all the required required decision parameters for drawing a circle using Midpoint Algorithm. Consider the starting point of circle as (r, 0) where r is the radius of the circle. Digitize a line with end points (50, 50) (54, 52) using BLA approach. [6+2=8]

9. a. What is the importance of projection in 3D viewing? Describe 1 point and 2 point perspective projection with illustration? [1+2=3]
   b. Explain 3D rotation about an axis which is not parallel to any one of the coordinate axes (Deduce the final transformation matrix)? [5]

KATHMANDU UNIVERSITY
End Semester Examination [C]
June/July 2024

Marks Scored:

Level : B.Sc.
Year : III
Course : COMP 342
Semester : I
Exam Roll No. :
Time: 30 mins.
F. M. : 10
Registration No.:
Date 30 JUN 2024

SECTION "A"
[20Q. × 0.5 = 10 marks]

Choose and mark [X] in the appropriate option.

1. Which application of Computer Graphics is used for conceptual design and layout of products in engineering process?
[ ] Computer aided design
[ ] Image processing
[ ] Education and training
[ ] Human computer interaction

2. If you are drawing an Ellipse with $r_x = 8$ and $r_y = 6$ and center at origin using midpoint algorithm then successive decision parameter P_{11} will be
[ ] -331 [ ] -224 [ ] -332 [ ] -44

3. While drawing a line using BLA, which factor/s is/are considered while selecting the sampling position?
a. Y intercept value of the line
b. Slope of the line
c. Starting point of the line
[ ] a only [ ] b only [ ] a & b [ ] a & c

4. What do you call the path the electron beam takes at the end of each refresh cycle?
[ ] Vertical retrace
[ ] Horizontal retrace
[ ] Monitor Bandwidth
[ ] Refresh rate

5. How much memory is needed for the frame buffer to store a 640 × 400 display with 16 different color levels?
[ ] 4096000 bits [ ] 512000 bits [ ] 1024000 bits [ ] 2048000 bits

6. The architecture of Random display system consists of:
a. Display Processing Unit
b. Pixmap
c. System Memory
[ ] a & b [ ] a & c [ ] a only [ ] a, b &c

7. The region code of a point is 1001. The point is in the _____ region of window.
[ ] Top right [ ] Top left [ ] Bottom left [ ] Bottom right

8. In which transformation step of 2D viewing transformation pipeline, all parts of the picture that lie outside the viewport are clipped?
[ ] MC to WC [ ] WC to VC [ ] VC to NVC [ ] NVC to DC

9. Which of the following are rigid body transformations?
a. Translation
b. Rotation
c. Reflection
d. Scaling
[ ] a, b & c [ ] b, c & d [ ] a, c, & d [ ] a, b, & d

10. What will be the reflected point of (-1, 0) about the line y=2?
[ ] (2, 1) [ ] (5, 0) [ ] (-1, 4) [ ] (4, -2)

11. If you rotate the point (20, 30) by 90 degrees anticlockwise and then translate it by (-20, 0) and then scale it by (2, 1), where will the point be?
[ ] (100,-20) [ ] (100, 10) [ ] (100, 20) [ ] (-100, 20)

12. What will be the final coordinates after 3D rotation of the point P (10, 10, 10, 1) represented in homogenous coordinate at 90° about Z-axis?
[ ] (10, -10, -10, 1) [ ] (-10, -10, -10, 1)
[ ] (-10, 10, 10, 1) [ ] (10, -10, 10, 1)

13. Which type of 3D projection is used to create the illusion of depth in a 2D image?
[ ] Parallel projection [ ] Perspective projection
[ ] Oblique projection [ ] Isometric projection

14. Which of the following visible surface detection technique can effectively handle the opaque and transparent surface?
[ ] Back face detection technique [ ] Z buffer method
[ ] Scan line method [ ] A buffer method

15. What is the Maximum number of overlapping objects that can be handled by using the Z-buffer algorithm?
[ ] Single object [ ] Two object [ ] Multiple object [ ] Two opaque object

16. In right handed viewing system with viewing direction along ~~the negative~~ z axis, the polygon is a back face, if _____, where C is a z component of surface normal vector.
[ ] $C = 0$ [ ] $C > 0$ [ ] $C < 0$ [ ] $C \leq 0$

17. Let R be the unit vector in the direction of specular-reflection, L be the unit vector directed toward the point light source, N be unit normal surface vector and V be the unit vector pointing to the viewer from the surface position. The specular-reflection is obtained when
[ ] L.N=0 [ ] L.R=0 [ ] L.V=0 [ ] R.V=0

18. In which of the following shading model, the vertex intensity is interpolated
[ ] Constant Intensity shading [ ] Gouraud shading
[ ] Phong Shading [ ] Fast phong shading

19. The RGB signal can be converted to a television signal using NTSC converter, converting
[ ] RGB values to HLS values [ ] RGB values to YIQ values
[ ] RGB values to HSV values [ ] RGB values to CMY values

20. Which steps of animation sequence defines the motion sequence as a set of basic events that are to take place?
[ ] Storyboard layout [ ] Object definitions
[ ] Key-frame specifications [ ] Generation of in-between frames